



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/585,959

09/18/2008

Chang-Jun Ahn

215384-106379

6194

44200

7590

07/06/2009

HONIGMAN MILLER SCHWARTZ & COHN LLP  
38500 WOODWARD AVENUE  
SUITE 100  
BLOOMFIELD HILLS, MI 48304-5048

EXAMINER

NGUYEN, LEON VIET Q

ART UNIT

PAPER NUMBER

2611

MAIL DATE

DELIVERY MODE

07/06/2009

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/585,959	<b>Applicant(s)</b> AHN ET AL.	
	<b>Examiner</b> LEON-VIET Q. NGUYEN	<b>Art Unit</b> 2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 15 October 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 September 2008 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>7/13/06, 1/18/07</u> .  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Information Disclosure Statement***

1. The information disclosure statement (IDS) submitted on 1/18/07 was filed after the mailing date of 1/18/07. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**2. Claims 1-12 rejected under 35 U.S.C. 103(a) as being unpatentable over Sandell et al (US20070217546) in view of Hamalainen et al ("On correlations between dual-polarized base station antennas", Global Telecommunications Conference, 2003. GLOBECOM '03. IEEE Publication Date: 1-5 Dec. 2003 Volume: 3, On page(s): 1664- 1668).**

Re claim 1, Sandell teaches a communication system comprising a transmitter and a receiver,

(a) the transmitter comprising:

Art Unit: 2611

a modulation unit which modulates data to be transferred (¶0029, encoder 404 accepts a string of modulation symbols. It would be obvious to have a modulation unit to output the modulation symbols);

a space-time coding unit which performs space-time coding on a signal originating from the modulation to acquire two signals (encoder 404 in fig. 4);

a first transmission unit which receives one of the space-time coded two signals (the top branch of the transmitting portion in fig. 4); and

a second transmission unit which receives another one of the space-time coded two signals (the bottom branch of the transmitting portion in fig. 4);

each of the first transmission unit and the second transmission unit including:

an inverse Fourier transform unit which performs inverse Fourier transform on signals originating from the serial-parallel conversion (IFFT 406 in fig. 4); and

a transmitting unit which transmits the inverse Fourier transformed signal to an antenna having a predetermined polarization polarity (antenna 410 in fig. 4, it would be obvious to know the polarization of each antenna),

(b) the receiver including:

a first reception unit which receives and processes a signal transmitted from the transmitter (the top branch of the receiving portion in fig. 4);

a second reception unit which receives and processes a signal transmitted from the transmitter (the bottom branch of the receiving portion in fig. 4);

a space-time decoding unit which performs space-time decoding on a signal originating from processing in the first reception unit and a signal

Art Unit: 2611

originating from processing in the second reception unit to acquire a single signal (decoder 418 in fig. 4, ¶0028); and

each of the first reception unit and the second reception unit including:

a receiving unit which receives a signal transmitted from the transmitter at an antenna having a predetermined polarization polarity (antenna 412 in fig. 4);

and

a Fourier transform unit which performs Fourier transform on the received signal (FFT 416 in fig. 4).

In a different embodiment, Sandell teaches in the transmitter:

a serial-parallel converting unit which performs serial-parallel conversion of a received signal (S/P 110 in fig. 1b); and

in the receiver:

a demodulation unit which demodulates the decoded single signal to acquire transferred data (de-mapping 164 in fig. 1b),

a parallel-serial converting unit which performs parallel-serial conversion on the Fourier transformed signals to acquire a signal as a processing result (P/S 158 in fig. 1b),

One of ordinary skill in the art would have been motivated to combine the two embodiments of Sandell to improve diversity gain and link robustness (¶0002 of Sandell).

Sandell fails to teach a polarization polarity of the antenna used by the first transmission unit being orthogonal to a polarization polarity of the antenna used by the second transmission unit, and

wherein an inclination of the first receive antenna to the first transmit antenna being approximately equal to an inclination of the second receive antenna to the second transmit antenna.

However Hamalainen teaches two orthogonally polarized transmit antennas (abstract, page 1667 right side last paragraph – page 1668 left side first paragraph, the cross-polarized antennas) with each having a 45 degree inclination (abstract, page 1667 right side last paragraph – page 1668 left side first paragraph, it would be obvious to have each of the antennas slanted 45 degrees as part of the design choice).

Therefore taking the combined teachings of Sandell and Hamalainen as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the features of Hamalainen into the system of Sandell. The motivation to combine Hamalainen and Sandell would be to avoid rapidly decreasing correlation (page 1667 right side last paragraph – page 1668 left side first paragraph of Hamalainen).

Re claim 2, the modified invention of Sandell teaches a communication system wherein an inclination of the first receive antenna to the second transmit antenna is approximately equal to an inclination of the second receive antenna to the first transmit antenna (abstract of Hamalainen, page 1667 right side last paragraph – page 1668 left side first paragraph of Hamalainen, it would be obvious to have each of the antennas slanted 45 degrees as part of the design choice).

Re claim 3, the modified invention of Sandell teaches a transmitter in the communication system (elements 404 - 410 in fig. 4 of Sandell).

Re claim 4, the modified invention of Sandell teaches a receiver in the communication system (elements 412 - 422 in fig. 4 of Sandell).

Re claim 5, the claimed limitations recited have been analyzed and rejected with respect to claim 1. It would be necessary to have a method of using the transmitter as claimed in claim 1.

Art Unit: 2611

Re claim 6, the modified invention of Sandell teaches a transmitting method wherein transmission to a receiver which performs reception using two antennas whose polarization polarities are orthogonal to each other is done (abstract of Hamalainen, page 1667 right side last paragraph – page 1668 left side first paragraph of Hamalainen, the cross-polarized antennas in MIMO systems), and

an inclination of the first receive antenna to the first transmit antenna is approximately equal to an inclination of the second receive antenna to the second transmit antenna (abstract of Hamalainen, page 1667 right side last paragraph – page 1668 left side first paragraph of Hamalainen, it would be obvious to have each of the antennas slanted 45 degrees as part of the design choice).

Re claim 7, the modified invention of Sandell teaches a transmitting method wherein an inclination of the first receive antenna to the second transmit antenna is approximately equal to an inclination of the second receive antenna to the first transmit antenna (abstract of Hamalainen, page 1667 right side last paragraph – page 1668 left side first paragraph of Hamalainen. It would be obvious to have each of the antennas slanted 45 degrees as part of the design choice).



Art Unit: 2611

Re claim 8, the claimed limitations recited have been analyzed and rejected with respect to claim 1. It would be necessary to have a method of using the transmitter as claimed in claim 1.

Re claim 9, the modified invention of Sandell teaches a receiving method wherein reception from a transmitter which performs transmission using two antennas whose polarization polarities are orthogonal to each other is done (abstract of Hamalainen, page 1667 right side last paragraph – page 1668 left side first paragraph of Hamalainen, the cross-polarized antennas in MIMO systems), and

an inclination of the first receive antenna to the first transmit antenna is approximately equal to an inclination of the second receive antenna to the second transmit antenna (abstract of Hamalainen, page 1667 right side last paragraph – page 1668 left side first paragraph of Hamalainen, it would be obvious to have each of the antennas slanted 45 degrees as part of the design choice).

Re claim 10, the modified invention of Sandell teaches a receiving method wherein an inclination of the first receive antenna to the second transmit antenna is approximately equal to an inclination of the second receive antenna to the first transmit antenna (abstract of Hamalainen, page 1667 right side last paragraph –

Art Unit: 2611

page 1668 left side first paragraph of Hamalainen. It would be obvious to have each of the antennas slanted 45 degrees as part of the design choice).

Re claim 11, the claimed limitations recited have been analyzed and rejected with respect to claim 1. It would be necessary to have a program to use the transmitter as claimed in claim 1.

Re claim 12, the claimed limitations recited have been analyzed and rejected with respect to claim 1. It would be necessary to have a program to use the receiver as claimed in claim 1.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LEON-VIET Q. NGUYEN whose telephone number is (571)270-1185. The examiner can normally be reached on Monday-Friday, alternate Friday off, 7:30AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David C. Payne can be reached on 571-272-3024. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2611

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Leon-Viet Q Nguyen/  
Examiner, Art Unit 2611

/Mohammad H Ghayour/  
Supervisory Patent Examiner, Art Unit 2611